NASA Giovanni Tool for Visualization and Analysis Support for the YOTC Program

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Overview of Year Of Tropical Convection (YOTC)

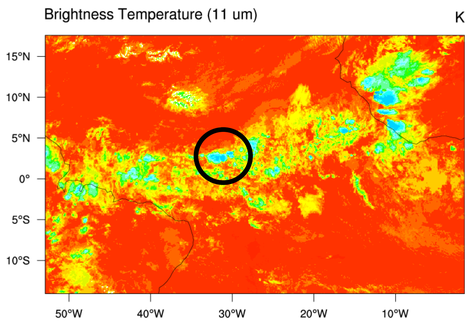
The fundamental challenges to overcoming our shortcomings in understanding and modeling/predicting tropical convection have been two folds: I) the need to represent the broad range of scales applicable to the tropical organization problem (i.e. cumulus to planetary), and II) the lack of observations that adequately and simultaneously characterize this broad range of scales and that also provide three-dimensional information on thermodynamic, radiative and dynamical interactions, including cloud microphysical processes.

Because the goal of YOTC involves examining a scientifically complex, multi-scale "process", rather than documenting the characteristics of a single parameter (e.g., SST, cloud cover), YOTC has an IOP perspective that targets a period, May 2008 – April 2010, long enough to encompass many cases of tropical convection activity in many of its most challenging yet influential forms. This includes mesoscale and synoptic variability, easterly waves and hurricanes, convectively coupled waves, the MJO, and the culmination of these in terms of the monsoon, their interactions with the extra-tropics, and mean characteristics such as tropical-to-subtropical transitions. The YOTC time period and length are driven in part by the following: 1) keeping the multi-sensor/multi-platform and model-analyses data sets and associated infrastructure manageable, 2) facilitating a focused effort by the research and operational communities on a specific scientific problem, and 3) capitalizing on the recent key additions to the armada of satellites (e.g., CloudSat and CALIPSO).

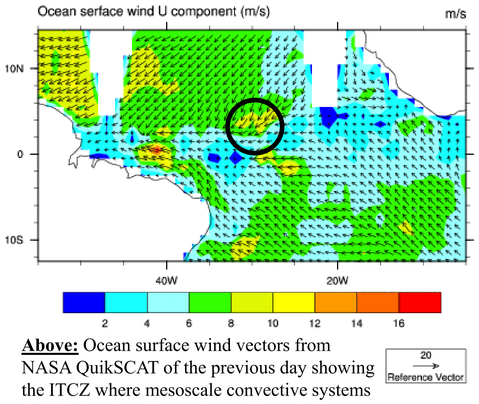
The dissemination framework for the YOTC satellite data archive is based on the Giovanni system. Giovanni is a web-based application developed by the NASA Goddard Earth Science (GES) Data and Information Service Center (DISC) that provides a simple and intuitive way to visualize, analyze, and access/download vast amounts of Earth science remote sensing data. For a more complete description, see http://giovanni.sci.gsfc.nasa.gov/. A prototype YOTC Giovanni System (hereafter YOTC-GS) is in the process of being developed. YOTC-GS will provide access to Level 2 (i.e. swath level data) and/or Level 3 (i.e. gridded/mapped data) forms of satellite data, the choice – or both – depending on what is appropriate and relevant. The former is needed and better suited for detailed process examination, exploiting the highest temporal-spatial resolutions available and comparison to regional cloud-system resolving model / cloud resolving model (CSRM/CRM) model output. The latter is needed and more well suited for examination of phenomena, conditions and processes on large to global scales, and for comparisons to global model analyses, prediction and simulation output. It can be accessed through the YOTC Portal at the GES DISC (http://disc.sci.gsfc.nasa.gov/YOTC).

Air France Flight 447

The YOTC instance provides a simple and easy way to investigate tropical weather phenomena. Here are a few examples investigating the mesoscale system that developed at the suspected crash site of AF447.



Left: Brightness temperature from the NCEP merged IR product at 0Z June 1, 2009, showing intensive mesoscale convective systems (MCS), or clusters of thunderstorms (circled in black) near the accident site.



Above: Ocean surface wind vectors from NASA QuikSCAT of the previous day showing the ITCZ where mesoscale convective systems (MCS) developed near the accident site.

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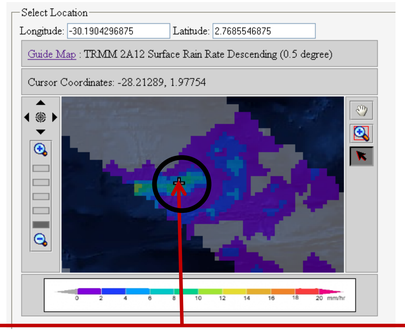
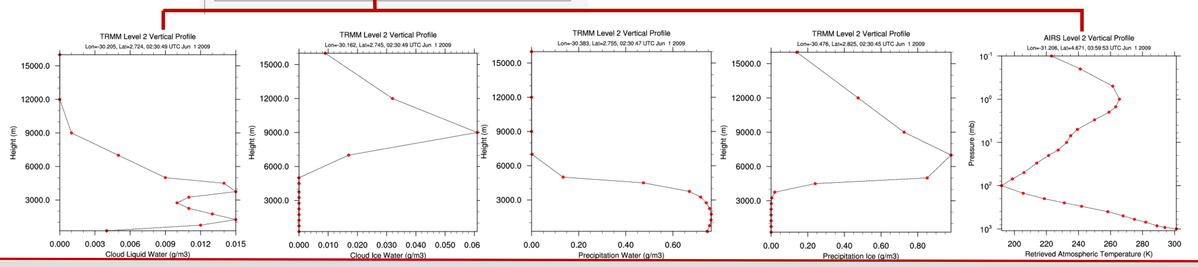
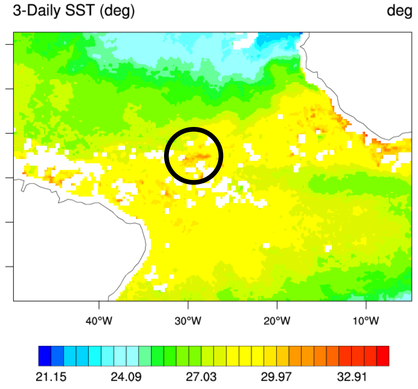
Reference Vector

Below: The YOTC instance allows to access vertical profiles of TRMM and AIRS. The plots on the right show TRMM hydrometeor profiles and AIRS temperature profile, respectively, for the MCS.



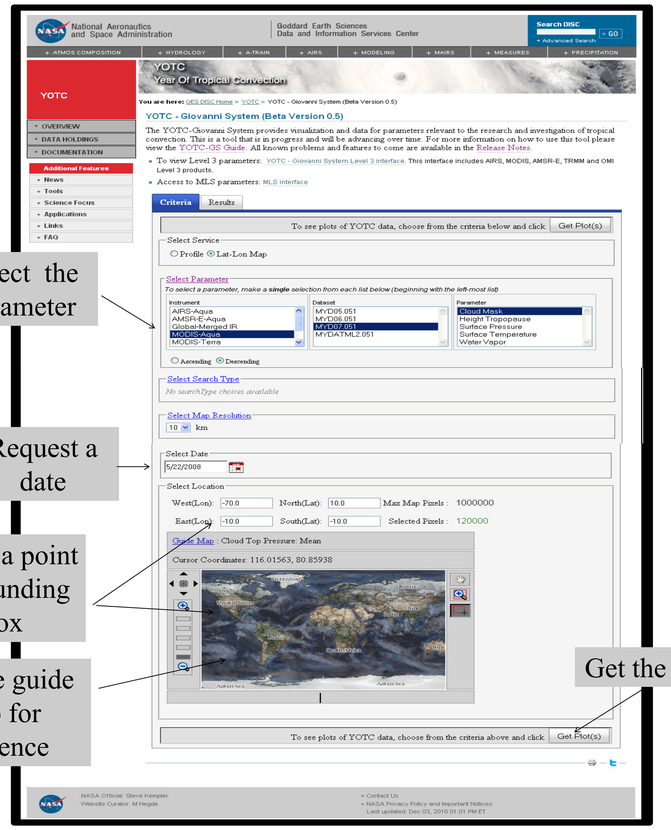




Left: Ocean surface temperatures (3 day averaging) from NASA TRMM Microwave Imager (TMI) of the previous day showing the higher-than-surrounding values (circled in black) in the accident area where mesoscale convective systems are found.

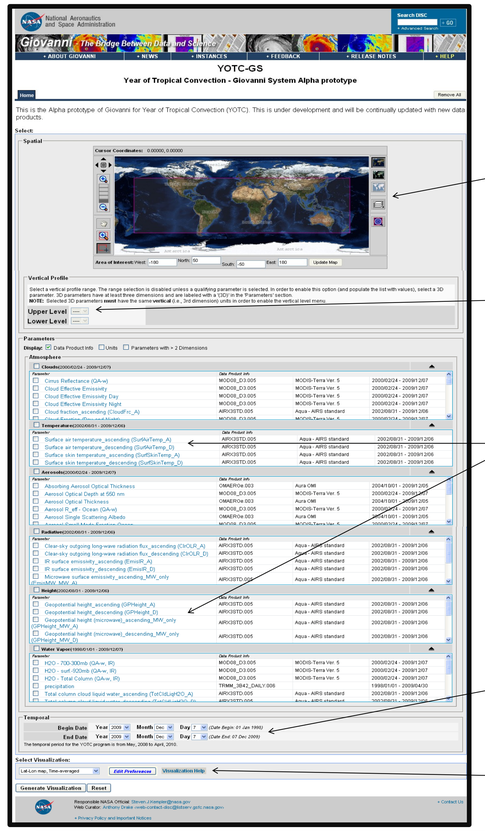
YOTC –GS L2

The **YOTC-GS L2** is a web application currently in beta development and demonstrates the new Giovanni system. The interface currently focuses on Level 2 data and provides users with a way to quickly view vertical profiles and lat/lon maps. AIRS, TRMM, MODIS, AMSR-E, MergedIR and QuikScat data can be extracted after a user makes the temporal and spatial selection providing a subsetted data output file and visualization. More data is expected to be added to this interface as development continues.



YOTC –GS L3

The **YOTC-GS L3** is a web application utilizing the current Giovanni system that provides users with the capability to quickly and easily generate maps and plots of available level 3 data. The data is categorized by parameters and is based on the scientific goals of the YOTC program. Users can make spatial selections from a high resolution map and have the ability to fine tune the generated output. Full access to the data is also available in multiple output formats to make the data more compatible with current software tools.



YOTC Portal

The **YOTC Portal** is a web-based information portal that provides the user community with information on the YOTC program satellite data sets. The information provided includes the data products that contain relevant parameters related to multi-scale processes and how to visualize and access this data. The information portal also provides access to data documentation and links to the original data archives.

Information Includes:
- Documentation
- Data Visualization
- Data Access
- Dataset Information
- Applications
- Science Focus

More Data Coming Soon